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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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|-----------------------------------|---|----------------------------------|
| In re U.S. Patent Application of: |) | |
| K. Estes <i>et al.</i> |) | |
| |) | |
| Serial No.: not yet assigned |) | Examiner: Not yet assigned |
| |) | |
| Filed: |) | Group Art Unit: Not yet assigned |
| |) | |
| For: NON-AQUEOUS WASHING |) | |
| APPARATUS AND METHOD |) | |
| |) | |
| |) | |

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Prior to the examination of the above-identified patent application, please enter the amendment presented below.

IN THE SPECIFICATION

After the title and before the Background of the Invention, please insert the following paragraph:

--RELATED APPLICATIONS DATA

The present application is a divisional application of U.S. Application Serial No. 09/520,653 filed on March 7, 2000; which is a divisional application of U.S. Application Serial No. 09/038,054, filed March 11, 1998, now issued as U.S. Patent No. 6,045,588; which claims the benefit of the filing date of provisional application 60/045,072, filed 29 April 1997; all disclosures of which are expressly incorporated by reference to the extent permissible by law.--

Please insert the following new paragraph after the paragraph beginning and ending on page 8, line 3:

--Figure 15 is a flowchart illustrating another non-aqueous method of laundering a fabric load in accordance with the present invention.--

Please insert the following new paragraph after the paragraph beginning on page 9, line 4:

The wash chamber 16 may be sealed and pressurized. The washing apparatus 11 may have means for pressurizing the wash chamber 16 to pressures of from about 5 atm to about 50 atm. When the wash liquor is dispensed from the dispensing means, the wash chamber may have a first pressure of between 1 atm and 50 atm. Further, the washing apparatus 11 may have means for reducing the pressure in the wash chamber 16 to a reduced second pressure less than the first pressure to remove any remaining wash liquor from the fabric load in vapor form.

Please replace the paragraph beginning on page 10, line 19, with the following rewritten paragraph:

--FIGS. 4-12 and 15 illustrate various methods of washing fabrics in accordance with the present invention. For definitional purposes, a fluid that possesses no deterative properties similar to those properties found in conventional detergents, dry cleaning agents and liquefied carbon dioxide will hereinafter be referred to as an ideal working fluid (IWF). Examples of IWFs that can be utilized with the methods and apparatuses of the present invention include fluoroinerts, hydrofluoroethers, perfluorocarbons and similarly fluorinated hydrocarbons.--

Please insert the following new paragraph after the paragraph beginning on page 14, line 3:

--Another method of practicing the present invention is illustrated in Figure 15. The method begins with loading the washing chamber of a wash machine at step 60 by disposing a fabric load in an interior chamber of a wash container. In the method illustrated in Figure 15, the washing chamber is pressurized to an elevated pressure of between 15 atm to about 50 atm at

step 250. A wash liquor is delivered to the fabric load in the pressurized chamber in the form of a mist at step 108. The wash liquor is a substantially non-reactive, non-aqueous, non-oleophilic, apolar working fluid and at least one washing additive. In one embodiment, the at least one washing additive is added after the working fluid is added to the fabric load. The fabric load may be subjected to a series of spray jets which spray IWF onto the fabric load at step 109. Further, the wash liquor may be pumped from the washing chamber and resprayed onto the fabric load. Mechanical energy is then applied at step 111 to provide relative movement between the fabric load and the mist for a time sufficient to provide fabric cleaning. Relative movement may be provided by rotating the wash container about a horizontal axis. The pressure in the chamber is then decreased at step 112 to volatilize the wash liquor. The volatilized wash liquor is removed from the chamber and fabric load at step 113. The volatilized wash liquor may be captured and condensed for reuse in step 113.--

Please replace the paragraph beginning on page 20, line 14, with the following rewritten paragraph:

--As indicated above in FIGS. 4-12 and 15, tumbling of the fabric, IWF and any additives including performance enhancers and co-solvents in the washing chamber is a suitable method of transferring mass, i.e. soils, from the fabric to the IWF and/or co-solvent. Other methods of mass transfer include rinsing, centrifugation, shaking, wiping, dumping, mixing and wave generation.--

Please replace the paragraph beginning on page 20, line 18, with the following rewritten paragraph:

--Also, as indicated above in FIGS. 4-12 and 15, the application of air is a suitable method of dehydration or drying the fabric. Other methods of drying may employ centrifugation, liquid extraction, the application of a vacuum, the application of forced heated air, the application of pressurized air, simply allowing gravity to draw the IWF away from the fabric and the application of a moisture absorbing material.--

Please replace the paragraph beginning on page 20, line 23, with the following rewritten paragraph:

--As indicated above in FIGS. 4-12 and 15, the IWF and co-solvents may be recovered through the use of gravity separation, filtration and centrifugation. In addition, de-watering, scrubbing, vaporization, phase inversion and the application of an induced electrical field may be used in recovery and purification of the IWF and co-solvents.--

IN THE DRAWINGS

Please note that Fig. 8 of the drawings reflects a change from “- 10psi” to “-10psi” at step 112 to correct the placement of the (minus) sign to be closer to the numeral 10.

Please add new Fig. 15 to the drawings.

IN THE CLAIMS

Please cancel claims 1-20 without prejudice or disclaimer.

Please add new Claims 21-39:

21. A wash liquor composition for use in laundering a fabric load comprising:
- a) a non-reactive, non-aqueous, non-oleophilic, apolar working fluid, and
 - b) at least one washing additive.

22. The composition of Claim 21 wherein the working fluid comprises a fluorine-containing compound selected from the group consisting of perfluorocarbons, hydrofluoroethers, fluorinated hydrocarbons, and fluorinerts.

23. The composition of Claim 22 wherein the fluorine-containing compound is $(CF_3(CF_2)_n)_3N$, where n is an integer from 4 to 20.

24. The composition of Claim 21 wherein the washing additive is selected from the group consisting of surfactants, enzymes, bleaches, ozone, ultraviolet light, hydrophobic solvents, hydrophilic solvents, deodorizers, fragrances, antistatic agents, antistain agents, and mixtures thereof.

25. The composition of Claim 24 wherein the washing additive is individually mixed with the working fluid.

26. The composition of Claim 21 which further comprises a co-solvent added to the working fluid to form a mixture, wherein the co-solvent is selected from the group consisting of water, alcohols, ethers, glycols, esters, ketones, and aldehydes, and wherein the mixture is sufficiently stable for a fabric washing application.

27. The composition of Claim 25 further comprising agents to further effect a change in at least one physical parameter of the working fluid, wherein the at least one physical parameter is selected from the group consisting of pH, ionic strength, conductivity, or polarity.

28. The composition of Claim 21 wherein the working fluid is a liquid.

29. The composition of Claim 21 wherein the working fluid has a surface tension of less than or equal to 35 dynes/cm².

30. The composition of Claim 21 wherein the working fluid has an oil solvency greater than water without being oleophilic.

31. The composition of Claim 30 wherein the oil solvency is less than or equal to 30 KB.

32. The composition of Claim 21 wherein the working fluid has a solubility in water of less than about 10%.

33. The composition of Claim 21 wherein the working fluid has a viscosity less than water under normal washing conditions.

34. The composition of Claim 21 wherein the working fluid has a pH from about 6.0 to about 8.0.

35. The composition of Claim 21 wherein the working fluid has a vapor pressure less than the vapor pressure of water.

36. The composition of Claim 21 wherein the working fluid has a flash point of greater than or equal to 145 °C.

37. The composition of Claim 21 wherein the working fluid is substantially non-reactive under washing conditions.

38. The composition of Claim 21 wherein the working fluid is substantially non-swelling to natural fabrics in the fabric load.

39. The composition of Claim 21 wherein the working fluid is hydrofluoroether.

REMARKS

Claims 1-20 have been cancelled without prejudice or disclaimer. Claims 21-39 have been added as new claims. Figure 15 has been added as a new Figure. The specification and drawings have been amended to include the subject matter of originally filed Claims 1-20 to the extent that the subject matter was missing in the original specification. Applicant submits that no new matter has been added by way of this amendment.

Applicants request prompt and favorable consideration of pending Claims 21-39.

Respectfully submitted,

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December 20, 2001

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I hereby certify that this document and any being referred to as attached or enclosed is being deposited with the United States Postal Service as first class mail in an envelope addressed to Assistant Commissioner for Patents, Washington, D.C. 20231, on

12/20/01
Date

JoEllen Hogan
JoEllen Hogan

APPENDIX

IN THE SPECIFICATION

The paragraph beginning on page 10, line 19 has been amended as follows:

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